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Crossings of the Sambre: An Archaeological Map of the River in Belgium

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Abstract

The study focuses on the Belgian part of the Sambre River, between the border with France and its confluence with the Meuse River at Namur. This part was canalized in the 19th and 20th centuries, during which time its length was reduced from 103 to 87.6 km. First, a recovery of its initial length was undertaken, using a Geographic Information System (GIS) and comparing old and current maps. Then, the river crossings (fords, bridges, and ferries) indicated on old military maps from the 17th to the 20th centuries were placed on the proposed restitution.

Keywords: River, archaeological map, crossings, ford, bridge, ferry

Introduction

This study (Lacroix, 2019) attempts to locate the old crossings (fords, bridges, and ferries) of the Sambre River in Belgium. Starting in Thiérache in the forest of La Haye-Cartigny, this river flows through northern France and Belgium. Navigable for 157 km from Landrecies (Arnould, 1958: 53), it passes through the cities of Maubeuge in France, and Erquelinnes, Fontaine-Valmont, Lobbes, Thuin, Charleroi, Floreffe, Auvelais, Salzinnes and Namur in Belgium.

The Sambre has many tributaries, such as the Helpe River in France and the Eau d'Heure, Piéton,and Orneau Rivers in Belgium. It appears that these streams do not play a key role in the flow of the Sambre River. Besides precipitation, the low permeability (the soil is mainly composed of schist, limestone, and sandstone), the narrowness, and the average declivity (0.4 m/km) of the valley are more relevant factors of disturbance. These can change the usually slow and irregular flow into a torrent (Arnould, 1958: 49-50).

Two different types of slopes for the Belgian part of the Sambre River are identified. Upstream from the city of Charleroi, the slope is quite steep, ranging from 0.4 to 0.9 m/km. Downstream, the slope is rather gentle at less than 0.4 m/km (Piérard, 1997: 5). This distinctive feature is an important factor that can explain the floods in the lower river during the 19th and 20th centuries. These floods led to the authorities' decision to canalize of the river.

The canalization of the Belgian Sambre

River engineering in the 19th century

The first canalization of the Belgian Sambre between 1825 and 1830 was due to economic reasons, by order of King Guillaume (Coisman, 2017: 315). Moreover, after this canalization, the city of Charleroi improved its economical connection to the Meuse River (east) and to France (west).

This work had four goals: 1) create a regular and constant draught, 2) build a continuous towpath that is easy to use, 3) slow down the stream with the construction of dams and locks, and 4) increase the tonnage of ships and reduce transport costs (Chiff, 1989: 102; Piérard, 1997: 46-47). During the process, 22 dams and locks, and many bridges were built. By removing meanders, the length of the Belgian Sambre was thus reduced from 103 to 93.5 km.

Canal works in the 20th century.

The second phase of canalization was undertaken in the lower part of the Sambre River, between the cities of Monceau-sur-Sambre and Namur. There were two main reasons. Firstly, after several major floods, there was a need to extend the canalization of the river to avert further disasters (Liénart and Wilkin, 2017: 115-117). These floods had many causes, such as weather events (heavy rain, snowmelt), sometimes worsened by the waterlogged soil, deforestation, urbanization, sewerage systems, and drainage systems that affected the regular water flow from the valley to the river. In addition, there were natural obstacles like meanders, shallows, narrowing of the river and artificial obstacles (such as dams, locks, and bridges) that increased the damaging consequences of the floods (Piérard, 1997: 97-98). The second reason had to do with economic matters: connecting the Meuse River (into which flows the Sambre) to the Charleroi-Bruxelles canal allowed for the tonnage of ships to increase once again.

In the framework of the new canalization in the 20th century, the authorities explored two options: 1) control the flow of the river with dams, reservoirs, dykes on banks, reforestation, and the diversion of the Sambre into other rivers[1], or 2) improve the flow of water by increasing its depth, width, and slope, and reducing bends which in turn reduces the length of the river again, this time from 93.5 to 87.6 km (Piérard, 1997: 105-111; Coisman, 2017: 311; Liénart and Wilkin, 2017: 117). The second option was chosen, and the old dams and locks of the 19th century were replaced with nine new locks and about 30 bridges were built in one span (Piérard, 1997: 118-120).

Nearly 200 years after its first canalisation in 1825, the Sambre's 103-km course was mapped to recover its original crossings.

Recovery of the Belgian Sambre

This recovery is based on the map of Count Joseph de Ferraris, the *Carte de Cabinet* (1770-1778), which shows the territory of the Austrian Netherlands with a fair degree of accuracy and therefore the whole Belgian Sambre River between the current Belgium-France border (situated in Erquelinnes) and the city of Namur. A Geographic Information System (GIS) was used to overlap different maps.

The first step was to draw the Sambre River in GIS with georeferenced polygons and then overlay the outcome on a current map[2] (**Fig. 1**). Despite the high level of accuracy of Ferraris' map, we noticed some areas of distortion, which could be the result of the cartographer's topographical operation in the 18th century. Indeed, he used Cassini's triangulation method, which is difficult to carry out in any circumstance. In this case, for example, the most significant distortions were close to forests.

The corrections carried out for the recovery map were based on: 1) the city's border when it was defined by the old course of the Sambre , 2) landscape markers such as old meanders, whether they were drained or not, and 3) the comparison between the roads on Ferraris' map (drawn in GIS with georeferenced polygons) with roads still surviving close to the Sambre by overlapping a current map of the valley (**Fig. 1**). This third process reveals the scale of the distortion, which allows the correction (**Fig. 2**). This method is only fully effective if there are many roads close to the river.

Crossings of the Belgian Sambre

The location and identification of crossings was based on both the analysis of old military maps dating from 1690 to the end of the 18th century, and on the *Albums de Croÿ* (Duvosquel, 1988), from the beginning of the 17th century. These crossings were placed on the recovery map of the Sambre River.

Overall, 83 crossings were spotted along the 103-km course of the river (**Fig. 3**), an average of one crossing every 1.24 km. The first type of identified crossing is the ford (**Fig. 4** and **Table 1**), which has been greatly developed due to the hydrological features of the Sambre (slow and irregular flow, many shallows), especially during summer, and low water levels.

The Sambre's strategic location at the heart of an important road network in western Europe could explain this large number of crossings, and, in some cases, their longevity, especially the bridges. Indeed, the river flows south of the Roman road Bavay-Tongeren-Köln and north of another Roman road, named Bavay-Trier. Between these two, we identified the development of a road network that crossed the Sambre at the many fords, bridges, and ferries. Many *villae* were located close to the river (similar to those at Aiseau-Presles and Châtelet, for example), as a road network was needed to put goods and products into circulation. Later, when the influences of *villae* decreased, castles (Merbes-le-Château and Thuin) and abbeys (Aulne, Floreffe, Lobbes, Moustier, and Malonne) took over the Sambre riversides.

The 12 bridges on the Sambre (**Fig. 5** and **Table 1**) are also close to human activity: 1) near a castle, like at Solre-sur-Sambre, Merbes-le-Château, Thuin, Landelies, and Namur 2) near an abbey, at Lobbes, Aulne[3], and Floreffe, 3) or near a village, like at Marchienne-au-pont, Châtelet, Pont-de-Loup, Tergnée, and Charleroi. Concerning Charleroi, it developed from 1667, as King Charles II of Spain started the construction of the village's fortifications. Vauban (a French military engineer) kept working on the fortifications from 1672 onwards during the reign of king Louis XIV of France. The construction of the first bridge could date from this fortification.

The small number of identified ferries (**Fig. 6** and **Table 1**) can be explained by the sources used in this study. Indeed, the military maps are mainly used to identify the locations of river crossings and to prepare the troops' movements. For this reason, the cartographers probably paid less attention to ferries and became more interested in bridges and fords.

The first observations of all the locks of the Sambre River were made by the French sergeant Louis De Franquet in the middle of the 18th century. He recorded the location of 18 locks (nine in France and nine in Belgium):

« *De 1692 à 1747, le cours rapide de la Sambre a été coupé par une suite d'écluses et de barrages construits successivement sur des plans différents et irréguliers, quelque fois dans l'intérêt de la navigation, mais le plus souvent dans l'intérêt des usines auxquelles la navigation était sacrifiée […]. Il y avait dix-huit écluses et barrages sur la Sambre, dont sept de Landrecies à Maubeuge, six de Maubeuge à Charleroy et cinq de Charleroy à Namur ; tous ces ouvrages tombaient en ruine et n'étaient, pour ainsi dire, d'aucune utilité pour la navigation* » (BrA, m. 3519, f. 189-236)

Later, Jean-Baptiste Vifquain wrote his report to the *Chambre des Représentants* (13th April 1842) about the Belgian locks:

« *Le premier à Labuissière, avec sas et portes busquées ; le second à Lobbes, moulin avec pertuis à vannes tournantes ; le troisième à Thuin, moulin avec vannes tournantes ; Le quatrième à l'abbaye d'Aulne, moulin, sas à deux vannes tournantes ; Le cinquième à Charleroy, déversoir éclusé, moulin, sas de navigation avec deux paires de portes busquées et pouvant contenir deux bateaux ; Le sixième à Couillet, pertuis fermé par une vanne tournante ; Le septième à Grognaux, sas avec deux vannes tournantes ; Le huitième à Salzinnes, sas avec deux vannes tournantes ; Le neuvième à Namur, sas avec vanne tournante à l'amont et vanne à coulisse à l'aval. La longueur des sas variait de 17,1 m à 71,25 m et la largeur des passages de 3,8 m à 3,95 m* » (Vifquain, 1842: 153).

Attested from the 13th century, the first locks were built by monasteries (Arnould, 1958: 57-63) (for example at Grognaux, where the lock was built by the Abbey of Floreffe), which is why Franquet reported the ruins of many locks in his work. The locks of Lobbes, Thuin and Aulne appear to be the oldest of the Sambre valley (Arnould, 1958: 53). The goals of these locks were: 1) to assist the functionality of mills, using 'water tanks' powered by hydraulic energy, and 2) to facilitate navigation, providing a minimum level of water. The description of Vifquain focuses on sluices and the presence of mills. Did these locks play a key role in the use of fords and ferries? Further research could provide an answer to this question.

Conclusion

Before the canal works in the 19th century, the Sambre River appears to have been easy to cross. The 73 crossing points identified with certainty (and 10 other "potential crossings" (**Fig. 7**)) support this theory (**Table 1**). The main method of crossing was the ford (67.5%), although these cannot be used year-round, as the rising waters would have made the crossing dangerous. Bridges (14.5%) and ferries (6%) have complementary functions with fords, while at the same time possess their own advantages and limitations. For example, bridges and ferries are controlled and their use is taxed. Ferries cannot sail safely during the rising or lowering of water level. Only bridges can be used throughout the year, but they need to be regularly inspected because their piles impede the flow of the river and can create a scour effect that weakens the bridge (Serna, 2006: 44).

The archaeological map of this study is intentionally limited to the location of crossings (fords, bridges, and ferries) on the Belgian part of the Sambre River before the canalization in the 19th century. Further research should complement this database by focusing on the Belgian underwater cultural heritage to contribute to its protection.

Acknowledgements

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Figures

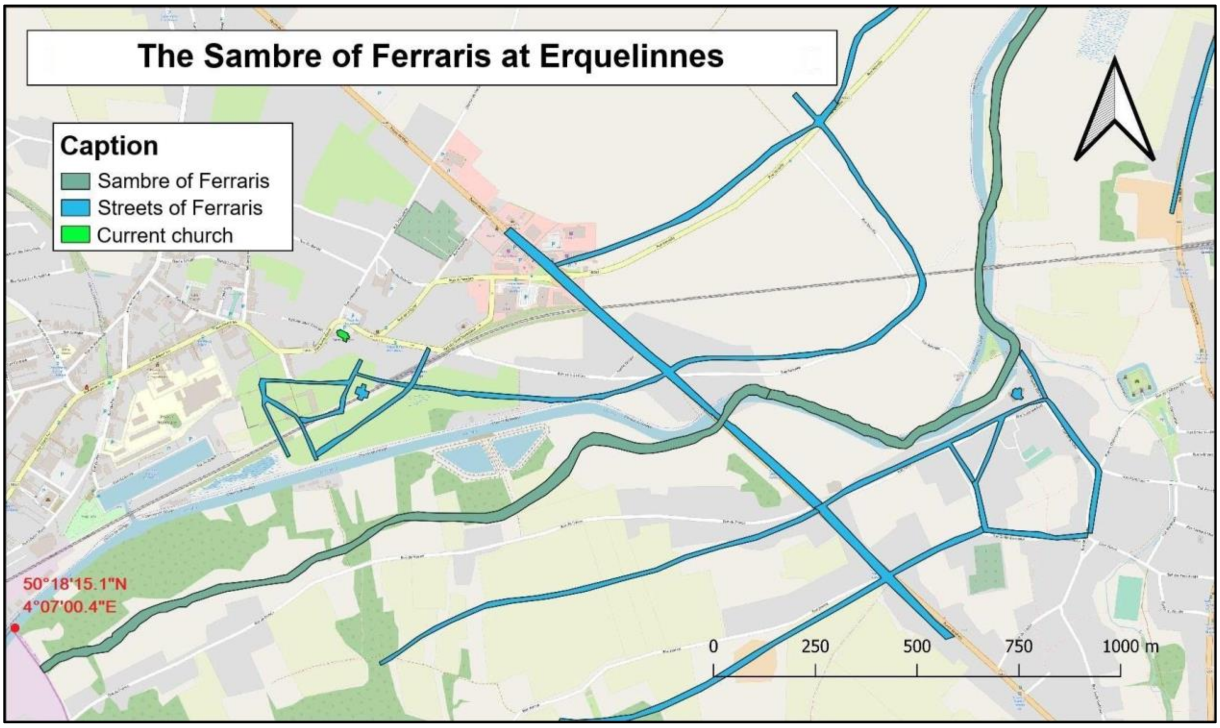

Fig. 1 – The Sambre of Ferraris at Erquelinnes (CAO: Lacroix A. Current map: OpenStreetMap (Open Database License – ODbL))

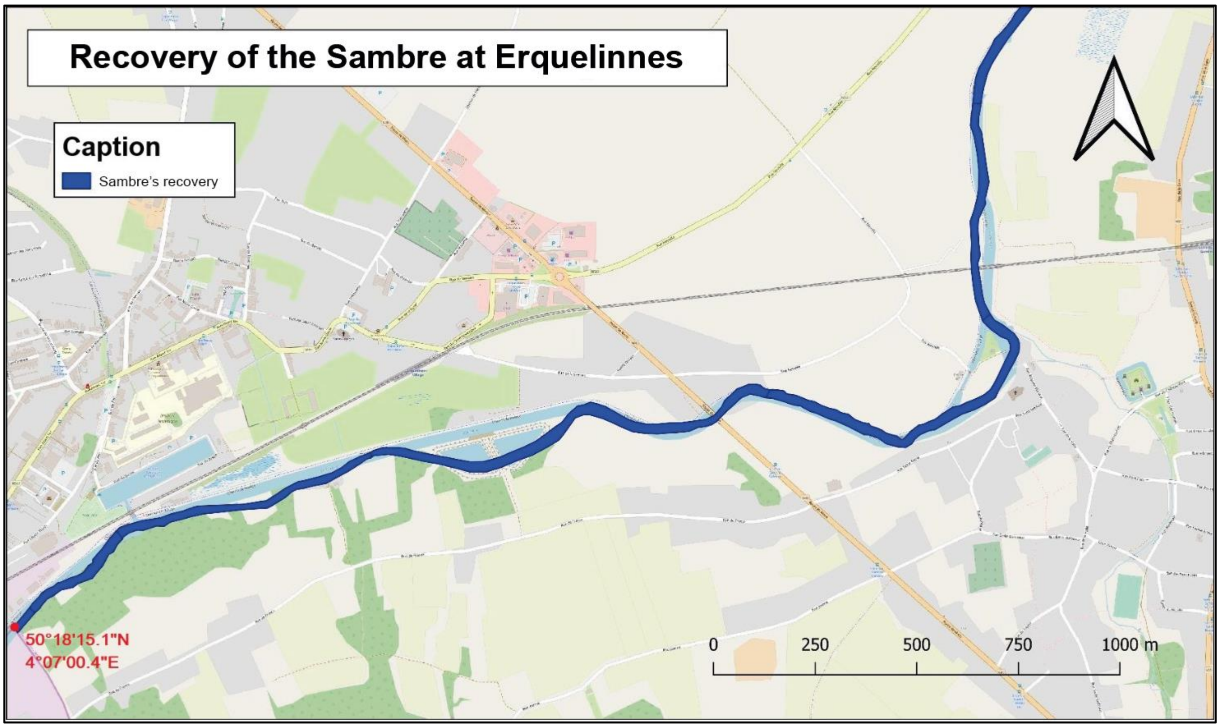

Fig. 2 – Recovery of the Sambre at Erquelinnes (CAO: Lacroix A. Current map: OpenStreetMap (Open Database License – ODbL))

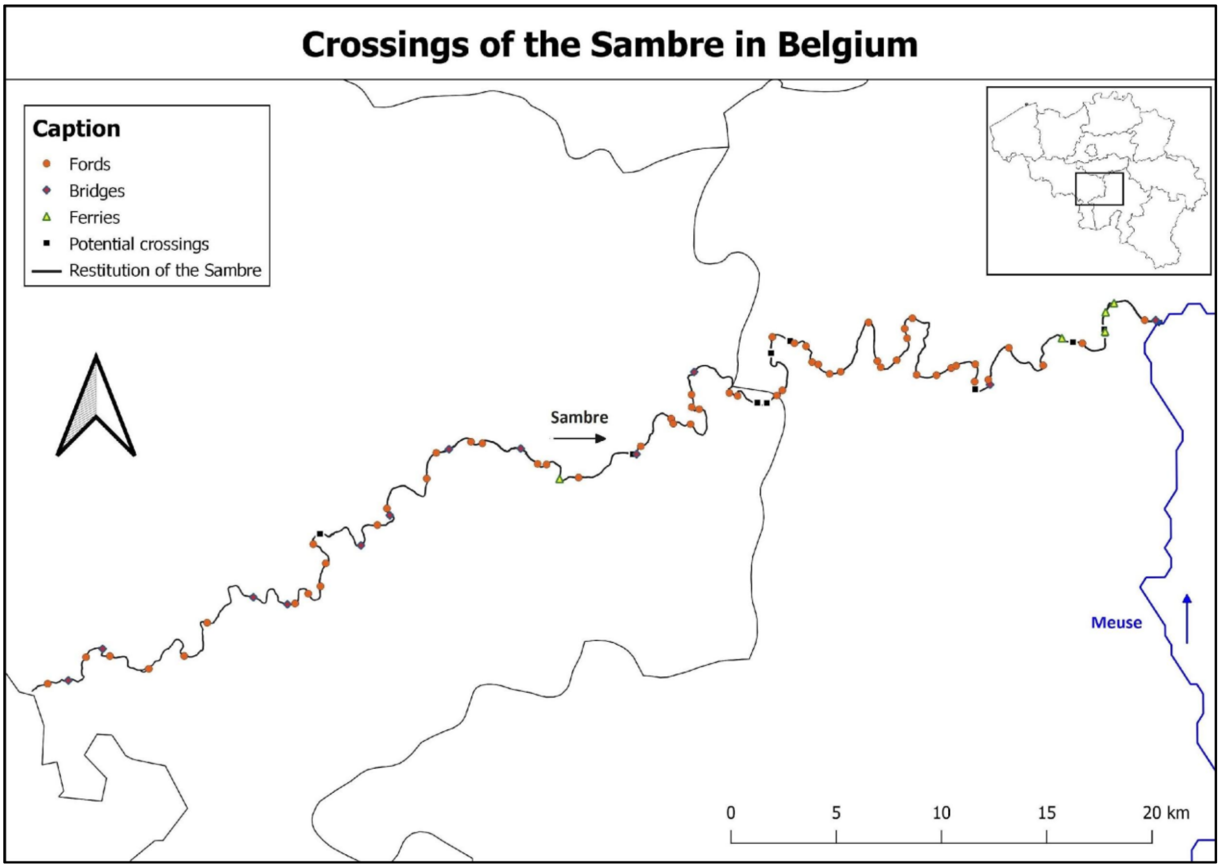

Fig. 3 – Crossings of the Sambre in Belgium (CAO: Lacroix A.)

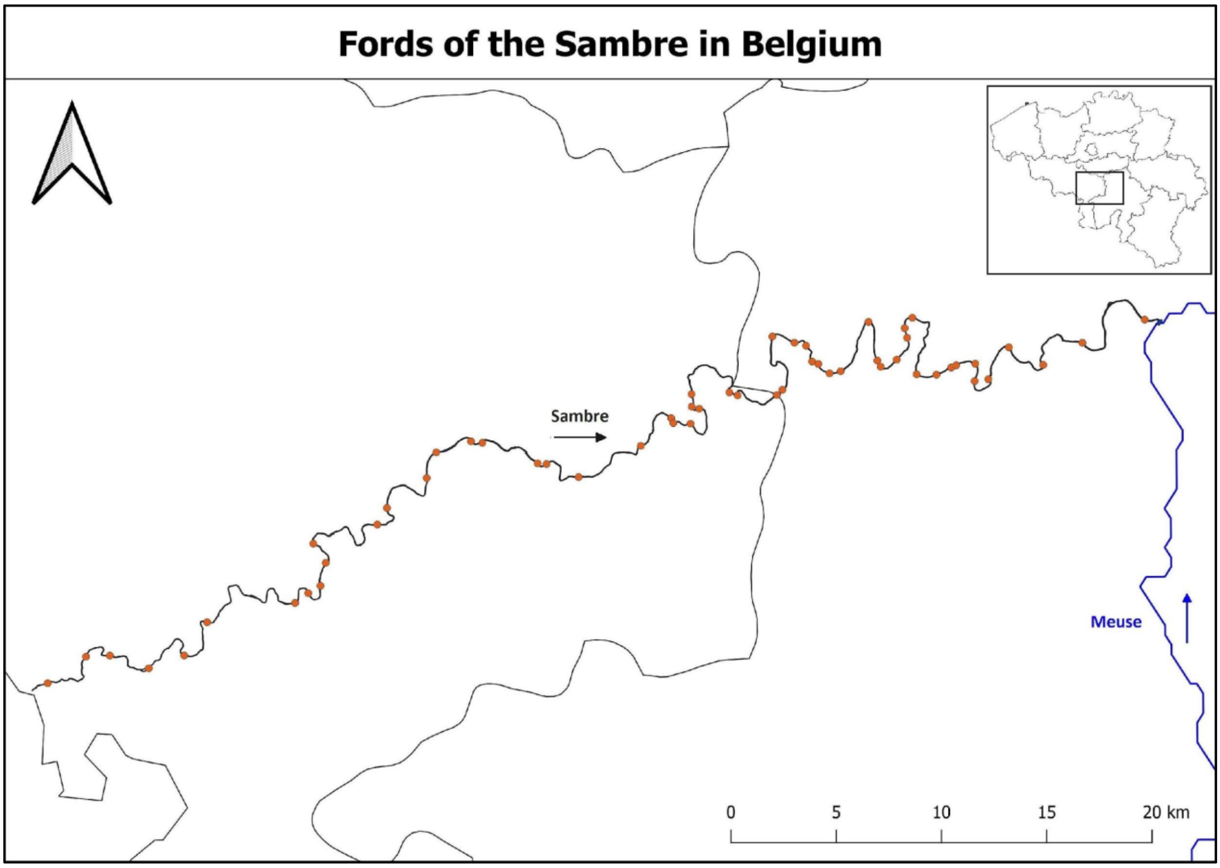

Fig. 4 – Fords of the Sambre in Belgium (CAO: Lacroix A.)

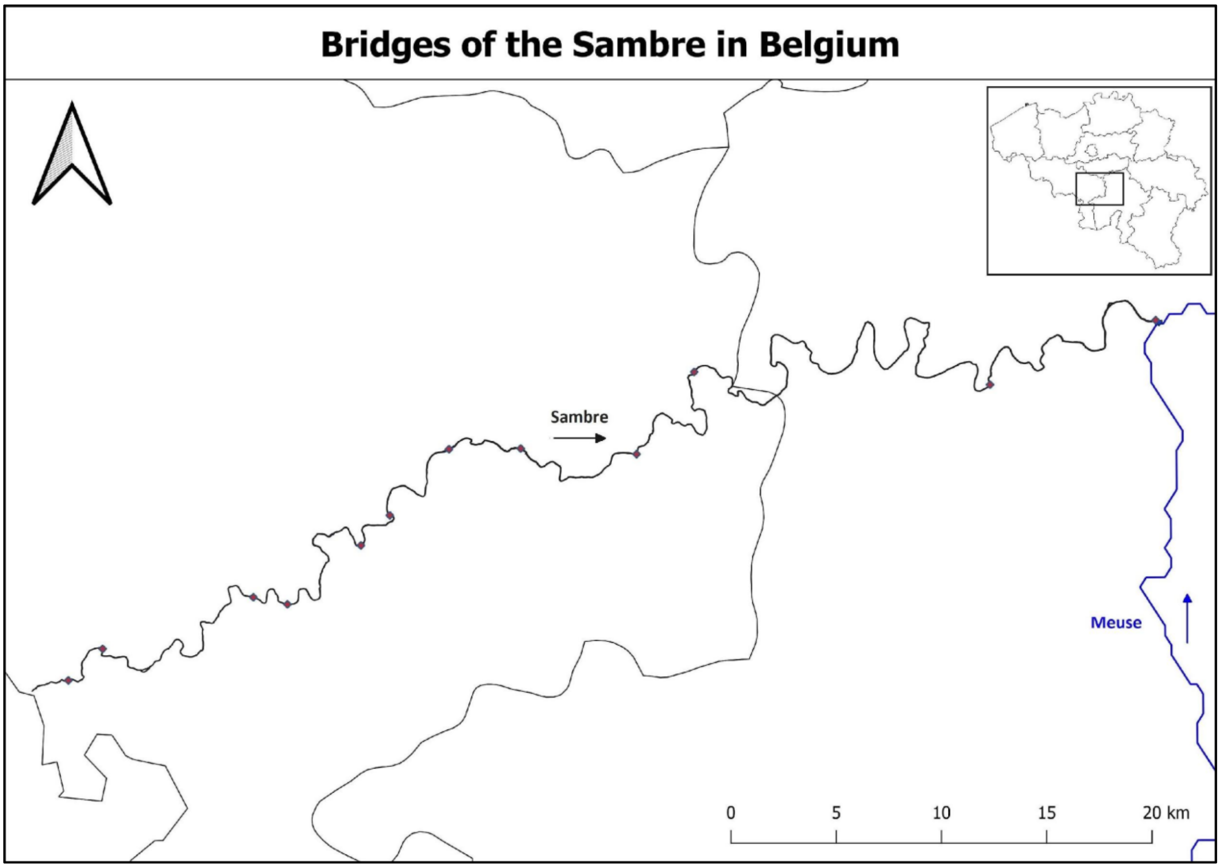

Fig. 5 – Bridges of the Sambre in Belgium (CAO: Lacroix A.)

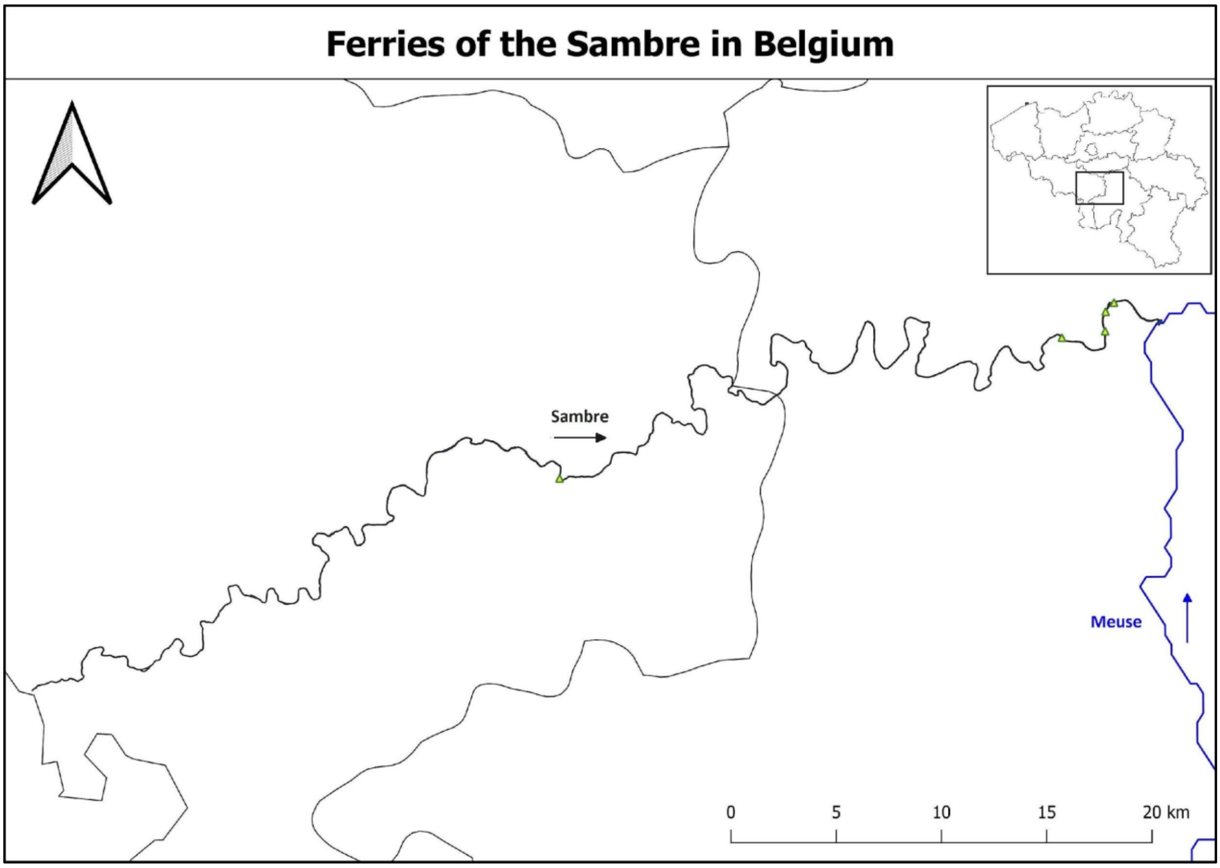

Fig. 6 – Ferries of the Sambre in Belgium (CAO: Lacroix A.)

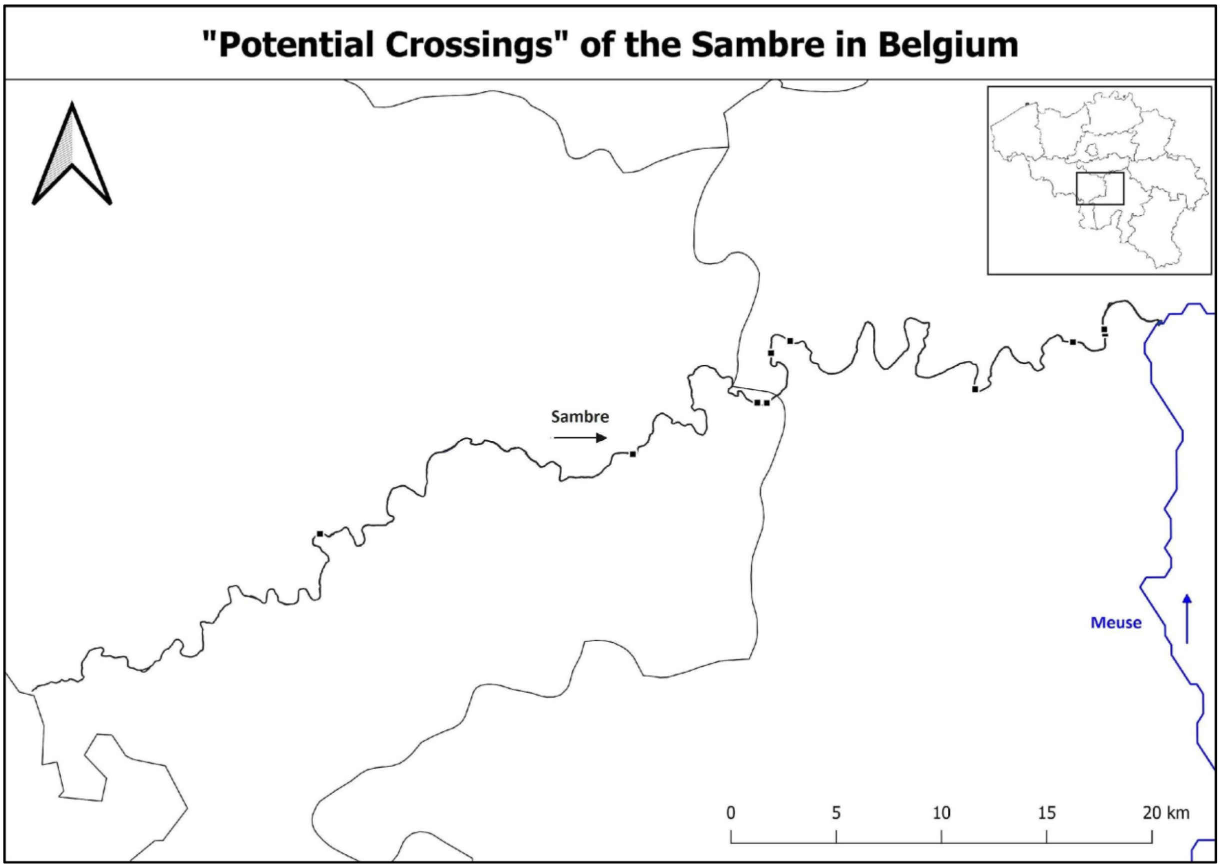

Fig. 7 – "Potential Crossings" of the Sambre in Belgium (CAO: Lacroix A.)

Table

Cities	Crossings				Locks
	Fords	Bridges	Ferries	"Potential Crossings"	
Erquelinnes	1	1			
Merbes-le-Château	5	1			1
Lobbes		1			1
Thuin	5	2		1	2
Montigny-le-Tilleul	3	1			
Charleroi	6	2	1		2
Châtelet	1	1		1	
Aiseau-Presles	3				
Farciennes	3	1			
Sambreville	11			4	1

Jemeppe-sur-Sambre	7				
Floreffe	8	1		1	
Namur	3	1	4	3	2
Total	**56** (67.5%)	**12** (14.5%)	**5** (6%)	**10** (12%)	**9**
	83				

Table 1 – Crossings and locks of the Belgian Sambre before 1825 (Lacroix, 2019)

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Carte du cours de la Sambre depuis sa source jusqu'à Thuin (1713. Paris, Bibliothèque nationale de France, département des Cartes et Plans, collection d'Anville, 01002 B).

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Carte topographique du comté de Namur : qui comprend le cours de la rivière de Sambre depuis Fontaine-L'Evêque jusqu'à Namur, et celui de la Meuse depuis Bouvines jusqu'à Huy (1750. Bruxelles, Bibliothèque royale de Belgique, section Cartes et Plans, WBS XIII B Prov. Namur – 1750 – Jaillot – III 3887).

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Endnotes

[1] This solution was not chosen for several reasons. Creating new dykes on the banks is useful as long as there is no breach or subsidence (like in the mining regions of Charleroi). Reforestation reduces the ground erosion, but it takes too much time to be effective. The division of the Sambre is hard to achieve in urban areas.

[2] We use the *OpenStreetMap* (https://www.openstreetmap.org/#map=10/50.3945/4.3739). It is an Open Access map (*Open Database License* (*ODbL*): https://opendatacommons.org/licenses/odbl/1-0/).

[3] The bridge of Aulne was built during the 13th century and partially destroyed in 1873 by the *Administration des Ponts et Chaussées* (Arnould, 1958: 48; Laurent, 2006: 95).